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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/045,579	11/07/2001	David Emil Nelson	DP-304144	8519

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EXAMINER

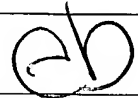
MCDONALD, RODNEY GLENN

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 03/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/045,579	NELSON ET AL.	
	Examiner	Art Unit	
	Rodney G. McDonald	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-39 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 112

Claims 11, 12, 14, 20, 31 and 32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 14 is indefinite because the words "high" and "low" lack basis for comparison.

Claims 11, 12, 31 and 32 are indefinite because the word "small" lacks antecedent basis.

Claims 11 and 31 are indefinite because the word "short" lacks antecedent basis.

Claim 20 is indefinite because "high" lacks basis for comparison.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-6, 9, 10 and 13-16 are rejected under 35 U.S.C. 102(e) as being anticipated by Nejezchleb et al. (U.S. Pat. 6,309,610).

Nejezchleb et al. teach a non-thermal plasma apparatus for treating Nox bearing gas streams. (See Abstract) Nejezchleb et al. teach in Figs. 4A and 4B the interior of

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reactor chamber 66 having a fluorocarbon member 78 configured with grooves 82 of selected dimensions to receive and support edge portions of double-dielectric electrodes 80. (Compare to an edge connected frame with the grooved portions being the edge connectors and the top and bottom portions of the fluorocarbon member being the first and second outer plates as required by Applicant claims. The edge connected frame is integral in that it is a one piece fluorocarbon member 78 as required by Applicant's claims specifically claim 16. See also Applicant's specification page 9 line 22-25 for "integral". The grooves represent Applicant's pockets created by the tines. Compare to Applicant's requirement of a low dielectric constant material) Different insulating member may be used with the reactor 64, configured with different separation distances between the grooves 82. (Compare to Applicant's requirement for variable pocket spacing of Applicant's claim 10) Accordingly, different desired gap dimensions may be attained. Supported on its edge portions, the electrodes 80 can be readily slide in and out of the chamber 66. The electrodes 80 are arranged in alternating high and low configuration and connected to the high voltage terminals 76 at opposite ends of the chamber 66. (Column 6 lines 58-68; Column 7 lines 1-2) (Compare to Applicant's required plurality of alternating polarity electrode plates.)

As taught in Fig. 1A the reactor includes at least a pair of dielectrically coated electrodes 26a and 26b and define a non-thermal plasma environment or reaction zone 28 therebetween. As shown in Fig. 1B, the electrode has a planar configuration and includes a metal electrode plate 30 covered with a coating 32 of a fluoropolymeric substance, for example fluorocarbon. The coating 32 isolates the electrode plate 30

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from the exhaust gas 11 and its nonconductive nature enables it to standoff a defined level of voltage that is applied to the electrode plate. The voltage is applied by the voltage 16 supply via a wire 34 that is attached to the plate 30 and extends through the coating 32. (Column 5 lines 1-13) accordingly, the plate of adjacent alternating high and low electrodes remain coated and isolate from the gas. These electrodes may be referred to as "double-dielectric" electrodes. (Column 5 lines 43-47) (Compare to Applicant's required dielectric barrier plate having an electrode and Applicant's requirement for double-dielectric electrodes.)

The strength of the electric field is not high enough to sustain arcing. (Column 5 line 65)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-10 and 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nejezchleb et al. (U.S. Pat. 6,309,610) in view of Rogers et al. (U.S. Pat. 6,139,694).

Nejezchleb et al. is discussed above and all is as applies above. (See Nejezchleb et al. discussed above)

The differences between Nejezchleb et al. and the present claims are that the use of a single dielectric edge connected element is not discussed and the discrete sections joined together to form an edge connected frame is not discussed.

Rogers et al. teach that the reaction chamber 14 may house a plurality of parallel plate electrodes 16i and dielectrics 20i. The electrodes 16i are configured to alternate between those that are positively charged and those that are negatively-charged. Correspondingly, the dielectrics 20i are configured to isolate **one or both sides** of the electrodes 16i from the gas stream 20. The voltage supply 26 may supply voltage to all the electrodes 16i, such that a plurality of non-thermal plasma environments or reaction zones 18i are created therebetween. (Column 6 lines 13-22)

The motivation for utilizing a single dielectric edge connected element is that it allows for isolating the electrode from the gas stream. (Column 6 lines 17-19)

Referring to Figures 3A and 3B a reaction chamber 50 constructed of aluminum is overlaid with Kapton and the upper portion is sealed with a plexiglass cover. (Compare to first and second out connector plates of dielectric material.) The

electrodes 52 are configured to alternate between positive (high) or negative (low) charges and are separated by planar dielectrics 64. (Column 6 lines 33-50) (Compare to dielectric edge connectors.)

Rogers further suggest that dielectric material may be grooved to allow electrodes to slide into and out of the chamber. (Column 6 lines 65-68; Column 7 lines 1-3)(Compare to providing dielectric edge connectors with tines)

The motivation for utilizing discrete connected pieces is that it allows for treating gases in a plurality of reaction zones. (Column 6 lines 20-22)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Nejezchleb et al. by utilizing a single dielectric edge connected element and the discrete sections joined together to form an edge connected frame as taught by Rogers et al. because it allows for isolating the electrode from the gas stream and for treating gases in a plurality of reaction zones.

Claims 18, 19, 21-26, 29, 30 and 33-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nejezchleb et al. (U.S. Pat. 6,309,610) in view of Andrews et al. (WO 00/49278).

Nejezchleb et al. is discussed above and all is applies above. (See Nejezchleb et al. discussed above) A high temperature housing can surround the electrodes see Figs. 3A and 4A items 44 or 66. (Figs 3A and Fig. 4A) The interior of the chamber can be overlaid with Kapton. (Column 6 line 26) (This is the mat supporting the edge-connected frame) Inlets and outlets allow gas into and out of the chamber. (Column 6 lines 24)

The differences between Nejezchleb et al. and the present claims are that the connection of the electrodes to high voltage source is not discussed and the connection of the electrodes to ground is not discussed.

Andrews et al. teach in FIG. 2 shows such a reactor bed in a reactor for the plasma-assisted treatment of the exhaust gases of an internal combustion engine (not shown in the Figure) to reduce noxious emissions therefrom. Referring to FIG. 2, the reactor 200 consists of a stainless steel reactor chamber 201 which has an inlet stub 202 and an outlet stub 203 by means of which it can be incorporated into the exhaust system of an internal combustion engine (not shown in the drawing). Inside the reactor chamber 201 are two support members 204 and 205 made of a ceramic insulating material such as alumina or MICATHERM micaceous glass as described in our publication WO99/20373. Housed into the supports 204 and 205 is a stainless steel cylinder 206 within which there is a matrix 207, such as that described with reference to FIG. 1, of cylindrical beads 208 made of a dielectric material, the permittivity of which is selected so as to optimise the plasma-assisted processing of the gaseous media that is flowing through the reactor. (Page 7 lines 15-34)

The connecting wires 105" of one set of beads 208 pass through the support 204 and ***are connected to a source of pulsed high potential 209 via a high voltage lead-through 210. The connecting wires 105 of the other set of beads 208 pass through the support 205 and thence to an earth point 211 to which the reactor casing 201 and the stainless steel cylinder 206 also are connected.*** The regions of the supports 204, 205 within the inner cylinder 206 are made to be readily gas

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permeable so as to keep to a minimum the back-pressure introduced into the exhaust system by the reactor. As explained above, dielectric material can be provided by applying to the electrically conducting wire or rod a coating of a dielectric material by thermal spraying, for example by plasma-spraying or by wet chemical techniques for example by sol-gel processing. ***Alternatively a metallic electrode can be deposited onto dielectric by any of a variety of techniques including chemical vapour deposition, thermal spraying, wet chemical techniques, screen printing, painting, dipping or other similar technique. Metal-coated dielectric materials are assembled in such a way that the metal is enclosed and in contact with dielectric material.*** (Page 7 line 35; Page 8 lines 1-29)

The motivation for connecting the electrodes to a high voltage source and connecting the other electrodes to ground is that it allows for reduction in the emission of carbonaceous and nitrogenous oxide combustion products. (Page 1 lines 3-8)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Nejezchleb et al. by utilizing high voltage connected electrodes and ground connected electrodes as taught by Andrews et al. because it allows for reduction in the emission of carbonaceous and nitrogenous oxide combustion products.

Claims 27, 28 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nejezchleb et al. in view of Andrews et al. as applied to claims 18, 19, 21-26, 29, 30 and 33-38 above, and further in view of Rogers et al. (U.S. Pat. 6,139,694).

The differences not yet discussed are the use of a single dielectric edge connected element is not discussed and the discrete sections joined together to form an edge connected frame is not discussed.

Rogers et al. is discussed above and teach the use of a single dielectric edge connected element and teach the discrete sections joined together to form an edge connected frame. (See Rogers et al. discussed above)

The motivation for utilizing a single dielectric edge connected element and discrete sections joined together to form an edge connected frame is that it allows for isolating the electrode from the gas stream and for treating gases in a plurality of reaction zones. (See Rogers et al. discussed above)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a single dielectric edge connected element and discrete sections joined together to form an edge connected frame as taught by Rogers et al. because it allows for isolating the electrode from the gas stream and for treating gases in a plurality of reaction zones.

Allowable Subject Matter

Claims 11, 12, 20, 31 and 32 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

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Claims 11, 12, 31 and 32 are indicated as being allowable over the prior art of record because the prior art of record does not teach the specific electrode pattern required in the claimed non-thermal plasma reactor element and claimed non-thermal plasma reactor.

Claim 20 is indicated as being allowable over the prior art of record because the prior art of record does not teach the claimed non-thermal plasma reactor including the adhesive to fix and protect the bus paths and secure the elements of the assembly together.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M- Th with Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
March 11, 2004